

Revision of North American *Aleiodes* Wesmael (Part 2): the *apicalis* (Brullé) Species-group in the New World (Hymenoptera: Braconidae, Rogadinae)

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Abstract.—The *Aleiodes apicalis* (Brullé) species-group is defined to include the following previously described species: *apicalis* (Brullé, 1832), *grandis* Giraud, 1857 (= *Rhogas malaisei* Shestakov, 1940 NEW SYNONYMY), *parasticus* Norton, 1869, *atriceps* Cresson, 1869, *abdominalis* Cresson, 1869, *rileyi* Cresson, 1869, *molestus* (Cresson, 1872) NEW COMBINATION, *schirjajewi* Kokujev, 1898, *convexus* van Achterberg, 1991 (= *Chelonorhogas rufithorax* Enderlein, 1912), and *brethesi* Shenefelt, 1975 NEW COMBINATION. One newly described species, *flavitarsus* Marsh and Shaw, is also included. The *apicalis* species-group is regarded as monophyletic based on the presence of dense setal mats on the apical metasomal terga of males. The genus *Dimorphomastax* Shenefelt, 1967 is synonymized under *Aleiodes*, and the species *Dimorphomastax peculiaris* Shenefelt, 1979 is regarded as a junior synonym of *Aleiodes atriceps* Cresson. *Rogas rufocoxalis* Gahan, 1917 is newly synonymized as a junior synonym of *Aleiodes molestus* (Cresson). A key to the New World species of the *apicalis* species-group is provided, and species treatments are given for Nearctic species, including diagnostic characters, distribution, and biological information.

The rogadoine braconid genus *Aleiodes* Wesmael is worldwide in distribution, but is particularly species-rich in the Holarctic region. *Aleiodes* is diverse in North America, with at least 90 species in the United States and Canada (Shaw *et al.* 1997). This paper is the second contribution in a series of planned papers on *Aleiodes* species-groups, intended to provide a complete revision of the genus for North America. In this paper we treat a distinctive monophyletic assemblage, the species of the *Aleiodes apicalis* species-group, as it occurs in the New World region. All members of this group have dense setal mats on male terga 4-7 (Fig. 1). Our definition of the species-group includes all species known to us, worldwide. However, because our main intent is to provide a revision for North American species, species treatments are limited to the Nearctic fauna.

Since only one other New World species is known to us, this is included in the key for convenience. The European species are currently being revised by Kees van Achterberg and Mark Shaw.

Aleiodes species are koinobiont endoparasitoids of lepidopteran larvae, especially macrolepidoptera of the superfamilies Noctuoidea and Geometroidea, and to a lesser extent, Arctioidea, Sphingoidea, and Papilionoidea (Shaw *et al.* 1997). Members of the *apicalis* group, as far as known, are mostly parasitoids of Noctuidae. The method of parasitism, unique to the tribe Rogadini, is noteworthy: the *Aleiodes* larva completes its feeding and pupates within the shrunken and mummified remains of the host caterpillar. The form of the mummy caused by a particular *Aleiodes* species is usually characteristic for that host and parasitoid, so the mummified remains are

of considerable diagnostic value and should be retained with the parasitoid, when reared. For more complete discussions of *Aleiodes* biology, readers may refer to Shaw (1983, 1994), Shaw and Huddleston (1991), Shaw (1995), and Shaw *et al.* (1997).

METHODS

Species covered in this paper can be identified as members of the subfamily Rogadinae using the keys of Shaw and Huddleston (1991), van Achterberg (1993), or Shaw (1995). Our definition of *Aleiodes* follows that of van Achterberg (1991), Shaw (1993), and Shaw *et al.* (1997). Specimens can be determined as *Aleiodes* using the keys of Marsh *et al.* (1987), van Achterberg (1991), or Shaw (1997). Specimens keyed through Marsh *et al.* (1987) will key to couplet 185, at which point they can be separated from *Rogas* by the presence of a discrete median carina on the propodeum, the lack of a foveate sternaulus on the mesopleuron, and the lack of a blunt basal tooth on the tarsal claw. In practice, more than 99% of U.S. and Canadian specimens encountered will be *Aleiodes*, as *Rogas s.s.* is only infrequently encountered north of Mexico (but increases in species richness in the neotropics). The species-groups of North American *Aleiodes* can be keyed using the key provided in Shaw *et al.* (1997). The species treated in this paper were formerly assigned to the *ductor* Thunberg species-group by Shaw *et al.* (1997) following a recent interpretation of that species by Papp (1985). However, Kees van Achterberg (pers. comm.) has indicated to us that previous interpretations of *ductor* are not correct, and that the species treated here are better called the *apicalis* species-group.

Terminology follows that used for *Aleiodes* by Shaw *et al.* (1997), Shaw (1993) and Marsh (1989). Microsculpture terminology follows that of Harris (1979). Wing venation terminology (see Fig. 16) follows that of Shaw (1997) and Shaw *et al.* (1997).

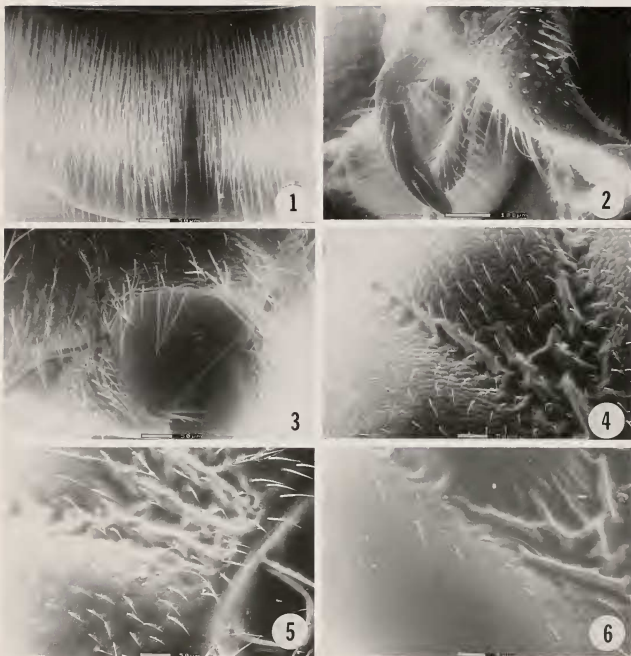
Abbreviations for museums are as follows: ANSP, Academy of Natural Sciences, Philadelphia; AEI, American Entomological Institute, Gainesville; AMNH, American Museum of Natural History, New York; CAS, California Academy of Sciences, San Francisco; CNC, Canadian National Collection, Ottawa; CUI, Cornell University, Ithaca; FSCA, Florida State Collection of Arthropods, Gainesville; HNHM, Hungarian Natural History Museum, Budapest; INHS, Illinois Natural History Survey, Urbana; MISU, Michigan State University, East Lansing; MSSU, Mississippi State University, Mississippi State; OKSU, Oklahoma State University; RMNH, Nationaal Natuurhistorisch Museum, Leiden; TAMU, Texas A. & M. University, College Station; UCD, University of California, Davis; UMSF, University of Minnesota, St. Paul; RMSEL, Rocky Mountain Systematic Entomology Laboratory, University of Wyoming, Laramie; USNM, U.S. National Museum of Natural History, Washington, D.C.

Authorship of species is attributed to the senior authors (PMM and SRS) in the order indicated.

ALEIODES APICALIS SPECIES-GROUP

Included species: *apicalis* (Brullé, 1832), *grandis* Giraud, 1857 (= *malaisei* Shestakov, 1940 new synonymy), *parasiticus* Norton, 1869, *atriceps* Cresson, 1869 revised combination (= *Dimorphomastax peculiaris* Shenefelt, 1979 new synonymy), *abdominalis* Cresson, 1869 (= *lectus* Cresson, 1869), *rileyi* Cresson, 1869 revised combination, *molestus* (Cresson, 1872) new combination (= *rufocoxalis* (Gahan, 1917) new synonymy), *schirjajewi* Kokujev, 1898, *convexus* van Achterberg, 1991 (= *Chelonorhogas rufithorax* Enderlein, 1912), *brethesi* Shenefelt, 1975 new combination (replacement name for *nigriceps* Brethes, 1909, preoccupied by *nigriceps* Wesmäl, 1838), and *flavitarisus* Marsh and Shaw, new species.

Diagnostic characters.—Ocellar diameter small, ratio of ocellar diameter to distance



Figs. 1-6. Fig. 1. Densely setose metasomal tergum 4. *A. abdominalis*, male. Figs. 2-3. Mandible and oral space. 2. *A. atriceps*, male. 3. *A. abdominalis*, male. Figs. 4-6. Mesonotal sculpture. 4. *A. abdominalis*. 5. *A. parasiticus*. 6. *A. brethesi*.

between lateral ocellus and compound eye less than 1; occipital carina meeting hypostomal carina laterally; dense setal mat present on male terga 4-7 and subdivided medially (Fig. 1); medial ridge extending down from 0.55 or more of distance from line between base of scape to clypeus; mesonotal disc sculpture finely granulate to smooth (Figs. 4-6), sparsely or not setose; tarsal claws strongly pectinate (Figs. 12-14).

Remarks.—A moderate-sized, circumpolar and neotropical monophyletic group, associated mostly with noctuids (see Fig. 15). There are some recorded associations with geometrids, lymantriids, pyralids, and even sawflies, but these need confirmation and the latter seems unlikely.

The dense setal mats on male terga 4-7 are undoubtedly synapomorphic. The function of the dense setal mats on male terga 4-7 is unknown, but perhaps they

may serve to disperse pheromones during courtship and mating.

Even fairly recently (Shenefelt, 1975; Marsh, 1979), species belonging in this group have been classified in several genera

(*Aleiodes*, *Chelonorhogas*, *Dimorphomastax*, and *Rogas*). *Chelonorhogas* was synonymized with *Aleiodes* by van Achterberg (1991), but retained *Chelonorhogas* as a valid subgenus, to which the *apicalis*-group is assigned.

KEY TO NEW WORLD SPECIES OF THE *ALEIODES APICALIS* SPECIES-GROUP

- 1 Mandible of male with a large, curved, tusk-like accessory tooth situated near the posterior condyle (Fig. 2), or female with a small accessory tooth situated near the posterior condyle; oral space unusually large; southwestern U.S. and Mexico . . . *A. atriceps* Cresson
- Mandible normal and unmodified, lacking a large, tusk-like tooth (males) or small tooth (females) near the posterior condyle (Fig. 3); oral space smaller (Fig. 3) 2
- 2(1) Mesosoma (excluding legs) entirely black 3
- Mesosoma color varying from entirely orange, to orange with extensive black markings posteriorly and laterally, but pronotum, mesonotum, and scutellar disc always colored bright orange 4
- 3(1) Hind tarsomeres orange to brown, similar to color of tibia; body length 6.0–8.0 mm; fore wing vein 1cu-a beyond vein 1M by less than 3 times its length; hindwing vein m-cu present (Fig. 16) *A. abdominalis* Cresson
- Hind tarsomeres 1–4 yellow, much lighter than color of tibia; body length 4.5–5.5 mm; fore wing vein 1cu-a beyond vein 1M by 3 times its length; hindwing vein m-cu absent (Fig. 17) *A. flavitarsus* Marsh & Shaw, new species
- 4(3) Body entirely orange to orangish brown; mesonotum granulate and dull
- *A. rileyi* Cresson
- Body only partly orange, head entirely black, legs, mesosoma, and apex of metasoma with variable black markings; mesosoma sculpture variable, but always somewhat shining and polished 5
- 5(4) Mesosoma entirely orange, legs entirely black; mesonotal disc entirely smooth and highly polished, virtually devoid of setae (Fig. 6); South American species
- *A. brethesi* (Shenefelt)
- Mesosoma usually orange and black (rarely entirely orange), leg color orange and black, coxae at least always orange; mesonotal disc not so completely smooth, with numerous setal pits (Fig. 5); North American species 6
- 6(5) Hind femur and tibia banded, orange on basal half, black on apical half; northern species associated with boreal forests *A. parasiticus* Norton
- Hind femur and tibia entirely black; southern species frequently associated with agroecosystems *A. molestus* (Cresson)
-

Aleiodes atriceps Cresson, revised
combination
(Fig. 2)

Aleiodes atriceps Cresson, 1869, Amer. Ent. Soc. Trans. 2:380.

Dimorphomastax peculiaris Shenefelt, 1979, Proc. Ent. Soc. Wash. 81:133. New synonymy based on examination of holotype.

Diagnosis.—Body bicolored, head including antenna black, mandibles and

palpi yellow, mesosoma varying from entirely black to entirely orange, tegula yellow, metasoma orange, legs orange, wings hyaline, veins brown except vein C+Sc+R and stigma yellow; body length, 6.0–7.0 mm; 46–53 antennomeres; malar space equal to basal width of mandible; oral opening circular, diameter equal to malar space in female and greater than malar space in male; ocelli small, ocellocular distance about twice diameter of lateral ocel-

lus; mandible in female with short triangular tooth at condyle, in male with large sickle-shaped tooth at condyle; occipital carina meeting hypostomal carina; head entirely coriaceous, sometimes smoother in male; pronotum rugose laterally; mesonotum and scutellum coriaceous, notauli weakly scrobiculate; mesopleuron smooth, subalar sulcus rugose, sternaulus absent; propodeum rugose, median carina complete; metasomal terga 1 and 2 costate-rugose, median carina complete; third metasomal tergum longitudinally costate over basal 0.25 to 0.5, smooth posteriorly; terga 4-7 in male with dense row of short yellow setae at base, and dense patches of yellow setae on each side of mid-line; fore wing with vein 1cu-a beyond vein 1M by distance nearly twice length of 1cu-a, hind wing with marginal cell gradually broadening to apex, vein RS straight on basal half and slightly bent downward on apical half, vein m-cu present; tarsal claws strongly pectinate with 6-7 stout teeth, apical 3 teeth of pectin about 0.75 as long as apical claw, remaining teeth gradually shorter towards base of claw; apical tibial spurs of male blunt.

Type material examined.—*Aleiodes atriceps* Cresson, holotype female, Mexico (ANSP). *Dimorphomastax peculiaris* Shenefelt, paratype female, Portal, Arizona (AEI).

Distribution.—Mexico, Arizona, and Texas.

Biology.—Unknown. Adults have been collected from July through December.

Comments.—Shenefelt (1975) classified *atriceps* under *Rogas*, but we are moving it here back to its original combination with *Aleiodes*. Although the unusual and distinctive shape of the mandible (Fig. 2) prompted Shenefelt (1979) to create a new genus for this species, we consider it to be only a specialized species of *Aleiodes* with peculiar mandibles. The species is, in most other characters, a typical *Aleiodes* and we consider the mandible shape, as well as the blunt tibial spurs of the male, to be autapomorphies. *Dimorphomastax* Shene-

felt, 1969 is therefore considered a junior synonym of *Aleiodes*, NEW SYNONYMY.

The unusual accessory mandibular tooth of this species is strongly sexually dimorphic (small triangular tooth in the female, large sickle-shaped projection in the male) suggesting a possible role in courtship and mating. The sexual dimorphism raises doubts about whether it may serve any primary cutting function, such as assisting in escape from the host mummy.

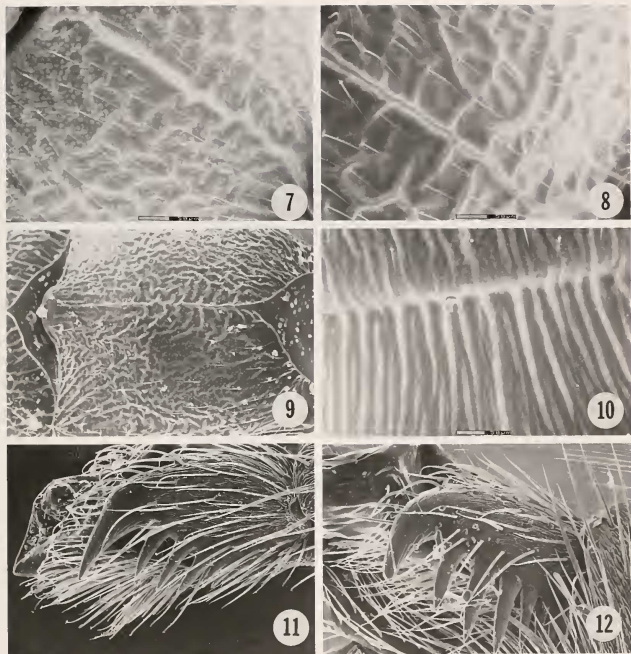
Aleiodes abdominalis Cresson

(Figs. 1, 3, 4, 7, 12, 16)

Aleiodes abdominalis Cresson, 1869, Amer. Ent. Soc. Trans. 2:379.

Aleiodes lectus Cresson, 1869, Amer. Ent. Soc. Trans. 2:379. Possible synonymy with *Aleiodes abdominalis* Cresson indicated by Cresson, 1869. Synonymized by Muesebeck & Walkley, 1951.

Diagnosis.—Body bicolored, head and mesosoma black, metasomal terga 1-3 orange, remainder of terga orange to black, antenna and legs orange, wings lightly dusky, veins brown, tegula yellow; body length, 6.0-8.0 mm; 54-63 antennomeres; malar space longer than basal width of mandible; face costate with distinct raised ridge between antennae, frons, vertex and temple coriaceous; oral opening circular, diameter about equal to basal width of mandible; propleuron rugose; mesonotum and scutellum finely coriaceous, notauli weakly scrobiculate and meeting in small rugose are before scutellum; mesopleuron smooth, subalar sulcus rugose, sternaulus absent; propodeum rugose-coriaceous, median carina on basal half only; first and second metasomal terga costate, median carina complete, third tergum costate at base, remainder smooth; apical terga of males, especially terga 4-7 densely covered with silvery setae, except along median line; fore wing with vein 1cu-a wing beyond vein 1M by distance greater than length of 1cu-a; hind wing with marginal cell gradually widening, vein RS slightly



Figs. 7–12. Figs. 7–8. Propodeal sculpture. 7. *A. abdominalis*. 8. *A. parasiticus*. Figs. 9–10. Metasomal sculpture. 9. *A. brethesi*, first tergum. 10. *A. brethesi*, border of second and third metasomal terga. Figs. 11–12. Tarsal claws. 11. *A. parasiticus*. 12. *A. abdominalis*.

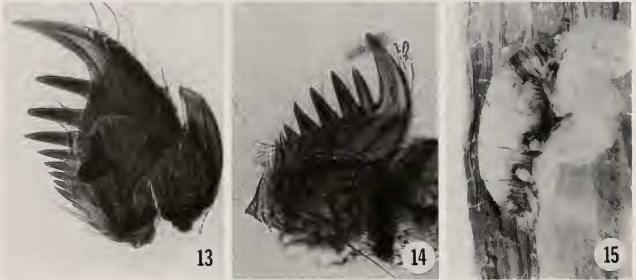
curved downward, vein m-cu present; tarsal claws strongly pectinate with 6–7 stout teeth, apical 3 teeth of pecten about 0.75 as long as apical claw, remaining teeth gradually shorter towards base of claw.

Type material examined.—*Aleiodes abdominalis* Cresson, holotype female, Pennsylvania (ANSP). *Aleiodes lectus* Cresson, holotype male, Illinois (ANSP).

Distribution.—Widely distributed in

eastern North America from Quebec and Ontario south to North Carolina, west to South Dakota and Arizona; more commonly encountered in the eastern parts of its range.

Biology.—Unknown. One specimen from Maryland is associated with an undetermined noctuid. The mummy is dark brown, smooth, and about 1 cm long. Adults appear in early June in the north-



Figs. 13–15. Figs. 13–14. Compound microscope photographs of slide-mounted tarsal claws. 13. *A. rileyi*. 14. *A. molestus*. Fig. 15. Mummified plusiine noctuid host larva parasitized by *A. molestus*.

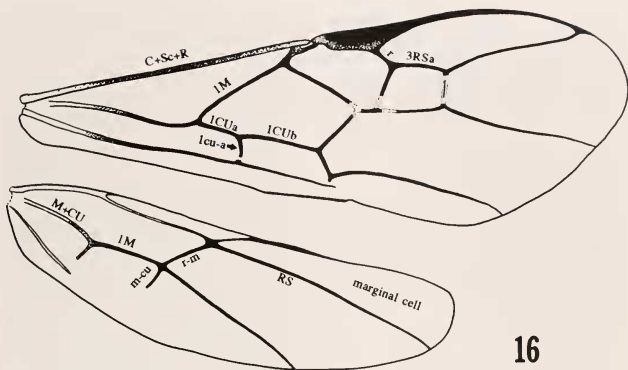
ern parts of its range; the specimens from Arizona were collected in late September.

Comments.—This is the most common member of the species-group with a mostly black body. The only other North American species in the group with an all-black mesosoma is *flavitorsus*, from which *abdominalis* can be distinguished by its larger body size (6.0–8.0 mm), fore wing vein 1cu-a beyond vein 1M by less than 3 times its length, and hindwing vein m-cu present (Fig. 16). The European species, *A. apicalis*, is also similar in body color and general appearance. However, *abdominalis* can be distinguished by its finely coriaceous to granulate mesonotum (Fig. 4), while the disc of the mesonotum is smooth-punctate in *apicalis*. Superficially, *abdominalis* is similar in color pattern (black and orange) to the very common species *A. terminalis* Cresson, but *terminalis* is a member of a different species-group, and can be easily separated by the species-group key provided in Shaw *et al.* (1997). Males of *terminalis* do not have densely setose metasomal terga 4–7.

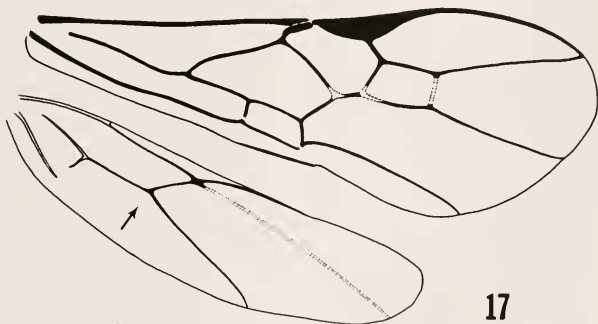
Aleiodes flavitorsus Marsh and Shaw,
new species
(Fig. 17)

Female.—Body color: head black, mandibles and mouthparts yellow, antenna

light brown; mesosoma black, propleuron sometimes brown or orange; tegula yellow; legs yellow except apical tarsal segments, apical 0.25 of hind femur and apical 0.5 of hind tibia which are black; metasoma with segments 1–3 yellow-orange except tergum 1 black medially and tergum 3 black apically, segments 4–8 black; wings hyaline, veins light brown, tegula yellow. Body length, 4.5–5.5mm. Head: malar space short, equal to basal width of mandible and about eye height; temple narrow, about 0.5 eye width; occipital carina not quite meeting hypostomal carina; oral space small and oval, width equal to malar space and about 0.5 face height; 46–49 antennomeres, all flagellomeres slightly longer than wide, first slightly longer than second; ocelli small, ocellular distance equal to or slightly greater than diameter of lateral ocellus; face rugulose-coriaceous with median carina between antennae; frons coriaceous; vertex and temples coriaceous; occiput smooth and shining; maxillary palpus not swollen; mandibles small, tips not overlapping when closed. Mesosoma: propleuron rugose, often smooth medially; mesonotum and scutellum coriaceous; notauli scrobiculate, meeting in small rugose area before scutellum; mesopleuron smooth and shining, rugose



16



17

Figs. 16-17. Wings showing venation terminology. 16. *A. abdominalis*. 17. *A. flavitarsus*.

dorsally and in subalar sulcus; sternaulus absent; propodeum rugose-coriaceous dorsally, coriaceous laterally, median carina obscured apically. Legs: tarsal claws strongly pectinate with 4-5 stout teeth,

apical 3 teeth of pectin about 0.75 as long as apical claw, remaining teeth gradually shorter towards base of claw; inner spur of hind tibia slightly less than 0.5 length of hind basitarsus; hind coxa smooth dor-

sally. Wings: hyaline; fore wing with vein r 0.5 length of 3RSa, vein 1cu-a beyond 1M by nearly 3 times length of 1 cu-a, vein 1CUa slightly longer than 1CUb; hind wing with vein RS straight, cell 1R1 gradually widening to wing apex, vein r-m slightly shorter than 1M, vein M+Cu slightly longer than 1M, vein m-cu absent. Metasoma: first tergum rugulostriate, median carina complete, length equal to apical width; second tergum rugulostriate, median carina complete; third tergum rugulostriate basally, smooth apically, median carina absent; fourth and following terga smooth; ovipositor short, about 0.5 length of hind basitarsus.

Male.—Essentially as in female.

Holotype.—Female: MICHIGAN: Marquette County, August 14, 1959, R. and K. Dreisbach. Deposited in USNM.

Paratypes.—CANADA, BRITISH COLUMBIA: 2 females, Gagnon Rd., 6 mi W Terrace, June 20, 1960, J. C. Chillcott, W. W. Moss; 4 females, Hixon, July 11, 1965–July 7, 1966, E. D. A. Dyer; 1 female, Terrace, July 9, 1960, W. R. Richards; 1 female, 10 km S Fernie, July 29, 1980, D. Williams. MANITOBA: 2 females, Big Eddy, em March 13, 1953, ex *Autographa* sp. NEW BRUNSWICK: 2 males, Kouchibougnac N.P., July 21, 1977, S. J. Miller. NEWFOUNDLAND: 1 male, Agr. Exp. Sta., St. John's, July 16, 1967, J. F. McAlpine. ONTARIO: 1 female, One Sided Lake, July 12, 1960, S. M. Clark; 1 male, North Branch, July 23, 1960, S. M. Clark; 1 male, Cumberland, June 13, 1975, L. Ling. QUEBEC: 1 female, 1 male, Parke Reserve, Kam. Co., July 5–12, 1957, G. E. Shewell. UNITED STATES, MAINE: 1 female, Oxford Co., Bryand Pond, July 23, 1976, leg. Heinrich. MICHIGAN: 1 female, Delta Co., August 6, 1959, R. & K. Dreisbach; 1 male, Houghton Co., August 20, 1959, R. & K. Dreisbach; 1 male, Schoolcraft Co., August 5, 1959, R. & K. Dreisbach. MINNESOTA: 1 female, Itasca St. Park, September 1927, S. Carthside. WASHINGTON: 1 female, Lake Cush-

man, July 22, 1917, A.L. Melander. Deposited in CNC, HNHM, MCZ, RMNH, RMSEL, USNM.

Distribution.—Widely distributed across Canada and the northern United States.

Biology.—Two specimens from Manitoba were reared from an unknown species of the genus *Autographa* (Noctuidae). Adults are active from late June through September. The specimens from Manitoba were labeled as emerging in March, but were probably collected during the previous summer and emergence may have been under laboratory conditions.

Comments.—This species is similar to *abdominalis*, but differs by its smaller body size (4.5–5.5 mm), vein 1cu-a of the fore wing being beyond vein 1M by three times its length (Fig. 17), by having hind tarsomeres 1–4 yellow, and by the absence of vein m-cu in the hind wing (Fig. 17).

Etymology.—The specific name is from the Latin *flavus* meaning yellow, in reference to the yellow hind tarsus.

***Aleiodes molestus* (Cresson), new combination**
(Figs. 14, 15)

Rogas molestus Cresson, 1872, Trans. Amer. Ent. Soc. 4:188.

Rogas rufocoxalis Gahan, 1917, Proc. U.S. Natl. Mus. 53:207. New synonymy based on examination of holotype.

Diagnosis.—Body bicolored, mesonotum orange, mesopleuron and propodeum varying from entirely black to entirely orange, with various intermediate forms occurring, metasomal terga 1–3 always orange, rest of terga varying from orange to black, legs beyond coxae dark brown or black, wings slightly dusky, veins brown, tegula orange; body length, 5.0–7.0 mm; 45–47 antennomeres; malar space long, slightly greater than basal width of mandible; face, frons and vertex rugulose, temple smooth; mesonotum and mesopleuron smooth; propodeum rugose, median carina complete; first and second metasomal terga strigate-rugose to costate, median

carina complete; fore wing with vein 1cu-a beyond 1M by distance nearly twice length of 1cu-a; marginal cell of hind wing narrowest basally, gradually widening toward wing apex; tarsal claws strongly pectinate with 6-8 stout teeth, apical 3 teeth of pecten about 0.75 as long as apical claw, remaining teeth gradually shorter towards base of claw.

Type material examined.—*Rogas molestus* Cresson, holotype female, Texas, G.W. Belfrage collection, [USNM]. *Rogas rufocoxalis* Gahan, holotype female, Colorado, Rocky Ford [USNM].

Distribution.—South Dakota south to Arkansas, Louisiana, Texas, and Mexico, west to Wyoming, Utah, Arizona, and southern California.

Biology.—Although *A. molestus* is commonly collected by Malaise trap, sweep net, or at lights, verified rearing records are less common. In the USNM collection there are single specimens labelled as reared from several plusiine and noctuine species including *Autoplusia egena* (Gn.), the soybean looper, *Pseudoplusia includens* (Wlkr.), the cabbage looper, *Trichoplusia ni* (Hbn.), and the variegated cutworm, *Peridroma saucia* (Hbn.). The known hosts are all generalist feeders on a variety of low vegetation including numerous crop species. Adults have been collected from late April through mid-September in the southern parts of its range.

Comments.—*A. molestus* is a fairly common midwestern and southern species favoring open fields, low vegetation, and agroecosystems. It belongs to the *parasiticus* assemblage, comprising *parasiticus* Norton, *molestus* (Cresson) and *brethesi* (Shenefelt), all of which have an orange mesonotum that is smooth and shining (as in Figs. 5-6) and well-developed longitudinal sculpture on tergum 2+3 (as in Fig. 10). *A. molestus* differs from *parasiticus* by having the legs entirely dark brown or black beyond the coxae (the femorae and tibiae are banded in *parasiticus*). It differs from *brethesi* by having orange coxae,

while the legs are entirely black in that South American species.

There is considerable variation in the extent of dark coloration on the mesopleuron and propodeum in *molestus*, consequently *rufocoxalis*, which differs only by having an entirely orange mesosoma, cannot be held as a valid species. In his description of *rufocoxalis*, Gahan (1917) stated that "it would not be surprising if it (*rufocoxalis*) would ultimately turn out to be merely a color variety of Cresson's species (*molestus*)." Indeed, although sometimes the mesopleuron and propodeum are entirely black, intermediates with less dark color and orange patches showing through are fairly common, so it would appear that Gahan's prediction is correct.

Aleiodes parasiticus Norton

(Figs. 5, 8, 12)

Aleiodes parasiticus Norton, 1869, Trans. Amer. Ent. Soc. 2:327.

Diagnosis.—Body bicolored black and orange, head black, antenna orange basally to black apically, mesosoma orange except mesopleuron below subalar sulcus and propodeum black, first and second metasomal terga orange, third tergum orange on basal 0.5, black on apical 0.5, remainder of terga black, fore and middle legs orange except apical tarsomeres black, hind coxa and trochanters orange, hind femur orange on basal 0.66, black on apical 0.33, hind femur yellow on basal 0.5, black on apical 0.5, hind tarsus orange except apical tarsomere black, wings lightly dusky, veins brown, tegula yellow; body length, 5.0-7.0 mm; face costate, frons and vertex rugose, temple punctate, occipital carina scrobiculate; malar space longer than basal width of mandible and about 0.5 eye height; ocellular distance longer than diameter of lateral ocellus; pronotum rugose; mesonotum smooth, mesopleuron smooth medially, subalar sulcus and sternaulus rugose; propodeum rugose dorsally, punc-

tate laterally, median carina complete; first and second metasomal terga costate-rugose, median carina complete, third tergum costate on basal 0.5, smooth on apical 0.5, median carina absent, remainder of terga smooth, fourth-seventh terga of male with dense patches of setae on apical 0.5 on each side of mid-line; fore wing with vein 1cu-a beyond 1M by distance twice length of 1cu-a, marginal cell of hind wing gradually widening, vein RS straight, vein m-cu absent; tarsal claws strongly pectinate with 5-6 stout teeth, apical 3 teeth of pectin about 0.75 as long as apical claw, remaining teeth gradually shorter towards base of claw.

Type material examined.—*Aleiodes parasiticus* Norton, holotype female, Connecticut (MCZ).

Distribution.—Eastern Canada and United States south to Maryland, west to North Dakota, Wyoming, and Colorado.

Biology.—We have examined specimens from the CNC and USNM collections labelled as reared from the plusiine noctuids *Anagrapha falcifera* (Kby.) and *Syngrapha epigaea* (Grt.). The former is a generalist on low plants including blueberries and clover, while the later is a generalist feeding on conifers including pines, spruces, and firs. The mummy formed is typically cream-colored and fairly smooth. Norton (1869) and Shenefelt (1975) listed this species as having been reared from the diprionid sawfly *Neodiprion abietis* (Harris) on *Abies*, but this seems very unlikely. Adults of *A. parasiticus* are active from late May to early September.

Comments.—*A. parasiticus* is similar to *molestus*, but *parasiticus* differs in having the posterior femur and tibia banded (orange on basal 0.5, black on apical 0.5). *A. parasiticus* is a distinctly northern species associated with boreal forests, while *molestus* is a midwestern and southern species favoring drier and more open habitats, including agroecosystems.

Aleiodes rileyi Cresson, revised
combination
(Fig. 13)

Aleiodes rileyi Cresson, 1869, Trans. Amer. Ent. Soc. 2:382.

Diagnosis.—Body unicolored orange or honey yellow, flagellum black, wings hyaline, veins brown, stigma yellow to light brown; body length, 5.5-8.0 mm; 53-55 antennomeres; malar space short, about equal to basal width of mandible and 0.25 eye height; ocelli large, ocellular distance equal to or slightly less (about 0.75) diameter of lateral ocellus; oral opening small and circular, diameter about equal to basal width of mandible; face rugose, frons smooth, vertex and temple coriaceous; occipital carina not meeting hypostomal carina; pronotum procate; mesonotum and scutellum coriaceous; mesopleuron smooth, subalar sulcus rugose, sternaulus absent; propodeum rugose dorsally, coriaceous laterally, median carina complete; first and second metasomal terga rugose costate, median carinae complete; third tergum costate on basal 0.33, smooth or weakly coriaceous on apical 0.66, sometimes entirely smooth or weakly coriaceous, median carina absent; remainder of terga weakly coriaceous; terga 4-6 in male with lateral patches of dense gold hair; fore wing with vein 1cu-a beyond 1M by distance slightly greater than length of 1cu-a; hind wing with vein RS arched in middle, marginal cell narrowest in middle; tarsal claws strongly pectinate with 7-8 stout teeth, apical 3-4 teeth of pectin about 0.75 as long as apical claw, remaining teeth gradually shorter towards base of claw.

Type material examined.—*Aleiodes rileyi* Cresson, holotype female, Missouri (ANSP).

Distribution.—Connecticut south to Florida, west to Michigan, Kansas, and Saskatchewan. It probably occurs throughout the eastern half of North America.

Biology.—We have examined specimens

from the CNC, INHS, and USNM collections labelled as reared from the noctuids *Acronycta oblinata* (J.E. Sm.), *Melanchnra picta* (Harr.), and *Nephelodes minians* Gn., the lymantriid *Dasychira vagans* (B. & McD.), and possibly the pyralids *Ostrinia obumbratalis* (Led.), and *O. penitalis* (Grt.). The known hosts are all generalist feeders on a variety of low vegetation, shrubs, and low trees such as willows. Adults of *Aleiodes rileyi* are active in Florida as early as January, but in northern parts of its range (Illinois) adult activity is in late summer (August).

Comments.—Marsh (1979) classified *rileyi* under *Rogas*, but we are moving it here back to its original combination with *Aleiodes*. *A. rileyi* is quite distinctive by being the only member of the species-group that is entirely orange; all other North American species in the *apicalis*-group have at least some black coloration on the body.

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